

Zukang Shen

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- Education:** **The University of Texas**, Austin, TX, USA Jun. 2003 – May 2006
Ph.D., Electrical Engineering.
Dissertation Title: “Multiuser Resource Allocation in Multichannel Wireless Communication Systems,” Co-advised by Prof. Brian L. Evans and Prof. Jeffrey G. Andrews
- The University of Texas**, Austin, TX, USA Aug. 2001 – May 2003
Master of Science, Electrical Engineering.
- Tsinghua University**, Beijing, China. Aug. 1997 – Jun. 2001
Major: Bachelor of Science, Electronics Engineering,
Minor: English

Academic Work Experience:

Sep. 2004 – Jan. 2006: Graduate Research Assistant, Dept. of ECE, UT-Austin, Austin, TX.
I am conducting research in the area of downlink multiuser MIMO channel capacity with applications to Wireless LAN and Fixed Wireless Systems.

Sep. 2003 – Dec. 2003: Teaching Assistant, Dept. of ECE, UT-Austin, Austin, TX.
Advanced Wireless: Modulation and Multiple Access, in which I delivered two lectures on equalization and multiuser OFDM, respectively. Other duties included office hours, homework grading, and course website maintenance.

Jun. 2003 – Aug. 2003: Graduate Research Assistant, Dept. of ECE, UT-Austin, Austin, TX.
I did research in the area of resource allocation in multiuser OFDM systems, which led to two conference papers and one journal paper.

Jun. 2002 – Aug. 2002: Graduate Research Assistant, Dept. of ECE, UT-Austin, Austin, TX.
I researched the area of equalization techniques for channel shortening in xDSL systems, and contributed to the software “UT Austin Multicarrier Equalizer Design Toolbox for Matlab”.

Sep. 2001 – May 2003: Teaching Assistant, Dept. of ECE, UT-Austin, Austin, TX.
Real-time Digital Signal Processing Laboratory, in which students designed, implemented, and tested a voiceband data modem. Students implemented the modem on TI TMS320C30 (2001-2002) and TMS320C6701 (2002-2003) digital signal processors by programming in C and assembly using Code Composer.

Industrial Work Experience:

- Feb. 2006 – present: System Engineering, Wireless Infrastructure Group, Texas Instruments, Dallas, TX.
I have been with Texas Instruments full-time since Feb. 2006.
- May 2005 – Aug. 2005: Summer Co-op, Wireless Infrastructure Group, Texas Instruments, Dallas, TX.

I worked on a system level simulator for 3GPP HSUPA, and compared different scheduling algorithms (proportional fairness, round-robin, etc) in terms of system throughput, fairness, and link reliability.

- Jan. 2004 – Aug. 2004: Co-op/Intern, NCS D Baseband Systems and Software Group, Motorola/Freescale Inc. Austin, TX.
I participated in a 3GPP TDD (TD-SCDMA) project, and developed a symbol rate processing library on the MSC8201ADS board.

Current Research Interests:

- Multicarrier communication systems
- Resource allocation in multiuser OFDM systems.
- Multi-antenna wireless systems
- Adaptive modulation
- Equalization in OFDM/xDSL systems

Publications:

Refereed Journal Articles:

- **Z. Shen**, R. Chen, J. G. Andrews, R. W. Heath, Jr., and B. L. Evans, “Sum Capacity of Multiuser MIMO Broadcast Channels with Block Diagonalization,” submitted to *IEEE Transactions on Wireless Communications*, Oct. 2005, under revision.
- **Z. Shen**, J. G. Andrews, and B. L. Evans, “Sum Capacity of MIMO Gaussian Broadcast Channels with Channel Frobenius Norm Constraints,” to appear in *IEEE Communications Letters*, 2006.
- **Z. Shen**, R. W. Heath, Jr., J. G. Andrews, and B. L. Evans, “Space-Time Water-filling for Composite MIMO Fading Channels,” to appear in *EURASIP Journal on Wireless Communications and Networking*, special issue on Radio Resource Management in 3G+ Systems, 2006.
- **Z. Shen**, R. Chen, J. G. Andrews, R. W. Heath, Jr., and B. L. Evans, “Low Complexity User Selection Algorithms for Multiuser MIMO Systems with Block Diagonalization,” to appear in *IEEE Transactions on Signal Processing*, 2006.
- **Z. Shen**, J. G. Andrews, and B. L. Evans, “Adaptive Resource Allocation in Multiuser OFDM Systems with Proportional Rate Constraints,” *IEEE Transactions on Wireless Communications*, vol. 4, no. 6, pp. 2726 – 2737, Nov. 2005.

Refereed Conference Papers:

- **Z. Shen**, R. Chen, J. G. Andrews, R. W. Heath, Jr., and B. L. Evans, “Sum Capacity of Multiuser MIMO Broadcast Channels with Block Diagonalization,” submitted to *IEEE Int. Symposium on Information Theory*, July 9-14, 2006, Seattle, WA, USA.
- **Z. Shen**, J. G. Andrews, and B. L. Evans, “Upper Bounds on MIMO Channel Capacity with Channel Frobenius Norm Constraints,” in *Proc. IEEE Int. Global Communications Conf.*, vol. 3, pp. 1505 – 1509, Nov. 28-Dec. 2, 2005, St. Louis, MO, USA.
- **Z. Shen**, R. Chen, J. G. Andrews, R. W. Heath, Jr., and B. L. Evans, “Low Complexity User Selection Algorithms for Multiuser MIMO Systems with Block Diagonalization,” in *Proc. IEEE Asilomar Conf. on Signals, Systems, and Computers*, pp. 628 – 632, Oct. 30-Nov. 2, 2005, Pacific Grove, CA, USA.
- **Z. Shen**, R. W. Heath, Jr., J. G. Andrews, and B. L. Evans, “Comparison of Space-Time Water-filling and Spatial Water-filling for MIMO Fading Channels,” in *Proc. IEEE Int.*

Global Communications Conf., vol. 1, pp. 431 – 435, Nov. 29-Dec. 3, 2004, Dallas, TX, USA.

- M. Ding, **Z. Shen**, and B. L. Evans, “An Achievable Performance Upper Bound for Discrete Multitone Equalization,” in *Proc. IEEE Int. Global Communications Conf.*, vol. 4, pp. 2297 – 2301, Nov. 29-Dec. 3, 2004, Dallas, TX, USA.
- I. C. Wong, **Z. Shen**, J. G. Andrews, and B. L. Evans, “A Low Complexity Algorithm for Proportional Resource Allocation in OFDMA Systems,” in *Proc. IEEE Int. Work. Signal Processing Systems*, pp. 1-6, Oct. 13-15, 2004, Austin, TX, USA.
- **Z. Shen**, J. G. Andrews and B. L. Evans, “Optimal Power Allocation in Multiuser OFDM Systems,” in *Proc. IEEE Global Comm. Conference*, vol. 1, pp. 337-341, Dec. 1-5, 2003, San Francisco, CA, USA.
- **Z. Shen**, J. G. Andrews, and B. L. Evans, “Short Range Wireless Channel Prediction Using Local Information,” in *Proc. IEEE Asilomar Conf. on Signals, Systems, and Computers*, vol. 1, pp. 1147-1151, Nov. 9-12, 2003, Pacific Grove, CA, USA.

Patents:

- **Z. Shen** and T. Muharemovic, “User Scheduling for High Speed Uplink Packet Access Systems,” under Texas Instruments internal review, Sep. 2005.

Presentations:

- Jan. 19, 2006, “Multiuser Resource Allocation in Multichannel Wireless Communication Systems,” Ph.D. defense, The University of Texas at Austin, Austin, TX.
- Nov. 30, 2005, “Upper Bounds on MIMO Channel Capacity with Channel Frobenius Norm Constraints,” lecture at Globecom’05, St. Louis, MO.
- Nov. 1, 2005, “Low Complexity User Selection Algorithms for Multiuser MIMO Systems with Block Diagonalization,” lecture at Asilomar’05, Pacific Grove, CA.
- Oct. 28, 2005, “User Selection Algorithms for Multiuser MIMO Systems,” lecture at 2005 Texas Wireless Symposium, Austin, TX.
- Aug. 18, 2005, “User Scheduling for High Speed Uplink Packet Access Systems,” internship end-of-term presentation at Texas Instruments, Dallas, TX.
- May 26, 2005, “Throughput and Fairness in Multi-Antenna Wideband Wireless Communication Systems,” lecture delivered to Texas Instruments, Dallas, TX.
- Feb. 16, 2005, “Increasing Connections Speeds for Next-Generation Wireless LANs Using Multiuser OFDM,” poster presentation at TI Development Conference’05, Houston, TX.
- Dec. 2, 2004, “Comparison of Space-Time Water-filling and Spatial Water-filling for MIMO Fading Channels,” lecture at Globecom’04, Dallas, TX.
- Oct. 22, 2004, “Multiuser OFDM with Variable Rate Constraints,” lecture at the Second Annual WNCG Wireless Networking Symposium, Austin, TX.
- Sep. 30, 2004, “Equalization,” guest lecture for EE 381V: Advanced Wireless – Modulation and Multiple Access, The University of Texas at Austin, Austin, TX.
- Jan. 28, 2004, “Multiuser Orthogonal Frequency Division Multiplexing for High-Speed Wireless Communication Systems,” Ph.D. qualifying presentation, The University of Texas at Austin, Austin, TX.
- Nov. 11, 2003, “Short Range Wireless Channel Prediction Using Local Information,” poster presentation at 37th Asilomar Conference, Pacific Grove, CA.
- Oct. 22, 2003, “Dynamic Resource Allocation in Multiuser OFDM Systems,” poster presentation at the First Annual WNCG Wireless Networking Symposium, Austin, TX.

Design Experience:

- Wireless Spread Spectrum Multiple Access System (IEEE 802.11b), Jan. 2001-Jun. 2001, Microwave and Digital Communications Lab, Tsinghua University, Beijing, China
- VLSI projects: Adder design; Wishbone SoC Interconnection Interface and Synchronous Serial Port, Dept. of ECE, UT Austin
- Embedded software system: VDSL system simulation using Agilent Advanced Design System (ADS), Dept. of ECE, UT Austin
- FM system design: transmitter and receiver, EE Dept, Tsinghua University

Software:

- G. Arslan, M. Ding, B. Lu, M. Milosevic, **Z. Shen**, and B. L. Evans, "UT Austin Multicarrier Equalizer Design Toolbox for Matlab," Version 3.1, Embedded Signal Processing Laboratory, The University of Texas at Austin, May 10, 2003.

Skills:

- Hardware description languages: VHDL, Verilog
- Hardware design automation tools: Xilinx FPGA Foundation Series, Active-HDL, Max, Sue, Primetime, VCS, Versim, Synopsis Design Analyzer, Spice, Protel
- Assembly languages: TI TMS320C30 DSP, TI TMSC6701 DSP, Intel 8086
- High-level languages: C, C++, Java
- Algorithm development environments: Matlab, Mathematica
- Software development tools: Code Composer, CodeWarrior

Honors:

- David Bruton, Jr. Graduate Fellowship, 2004 – 2005, awarded by Office of Graduate Studies, The University of Texas at Austin
- TxTEC fellowship, 2003 – 2004, Dept. of ECE, UT Austin
- TxTEC fellowship, 2001 – 2002, Dept. of ECE, UT Austin
- 'Kodak' scholarship, Nov. 2000, Tsinghua University
- 'Baogang' scholarship, Nov. 1999, Tsinghua University
- 'Dongfang Communications' scholarship, Nov. 1998, Tsinghua University
- Freshman scholarship, Nov. 1997, Tsinghua University

Professional Activities:

- IEEE student member since 2001
- Session chair, "WNCG Track," Texas Wireless Symposium, Oct. 2005, Austin, TX
- Session co-chair, "Cellular Systems," the Second Annual WNCG Wireless Networking Symposium, Oct. 2004, Austin, TX.
- Reviewer for the following journals
 - *IEEE Transactions on Signal Processing* (2005 – present)
 - *IEEE Transactions on Communications* (2005 – present)
 - *IEEE Journal on Selected Areas in Communications* (2005 – present)
 - *IEEE Transactions on Wireless Communications* (2004 – present)
 - *IEEE Transactions on Vehicular Technology* (2004 – present)
 - *IEEE Communications Letters* (2004, 2006 – present)
 - *IEEE Signal Processing Letters* (2004)

- *EURASIP Journal on Wireless Communications and Networking* (2005 – present)
- *Journal of Circuits, Systems and Signal Processing* (2004)
- Reviewer for the following conferences
 - *2006-Fall IEEE Vehicular Technology Conference*
 - *2006 IEEE International Conference on Communications*
 - *2006 IEEE Wireless Communications and Networking Conference*
 - *2005 IEEE International Conference on Communications*
 - *2005 IEEE Global Telecommunications Conference*
 - *2005 IEEE International Conference on Acoustics, Speech, and Signal Processing*
 - *2005-Fall IEEE Vehicular Technology Conference*
 - *2005-Spring IEEE Vehicular Technology Conference*
 - *2004 IEEE International Conference on Communications*
 - *2004 IEEE Global Telecommunications Conference*
 - *2004 IEEE Radio and Wireless Conference*

Visa: F-1 with OPT, citizen of P. R. China.